REMARKS

These Remarks are in reply to the Final Office Action mailed October 16, 2008. Claims 1-24 were pending in the Application prior to the outstanding Final Office Action. Claims 1, 2 and 14 are currently being amended, new claims 25-28 are being added, and no claims are being canceled, leaving claims 1-28 for the Examiner's consideration. Support for the new claims is provided in the application as originally filed, and thus, no new matter has been added. In view of the above amendments and the remarks below, Applicants respectfully request that the rejections be reconsidered and withdrawn, and that a Notice of Allowance be issued.

I. Claim Rejection Under 35 U.S.C. § 112

Claim 2 was rejected under 35 U.S.C. § 112, second paragraph. Claim 2 has been amended to change the phrase "the group" to "a group". It is respectfully requested that this rejection be reconsidered and withdrawn.

II. Summary of Claim Rejections under 35 U.S.C. §§ 102(b) and 103(a)

Claims 1, 3, 5, 9-11, 14, 16, 20, 22, and 23 were rejected under 35 U.S.C. 102(b) for allegedly being anticipated by U.S. Patent Publication No. 2001/0010482 to Oki et al. (hereafter referred to as "Oki").

Claims 2, 6-8, 12, 13, 15, 18, 19, 21, and 24 were rejected under 35 U.S.C. 103(a) for allegedly being unpatentable over Oki.

Claims 4 and 17 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Oki, and further in view of U.S. Patent No. 6,396,250 to Bridge (referred to hereafter as "Bridge").

(a discussion of the claims begins on the next page)

III. Discussion of Claims

Claim 1, as amended, is reproduced below for the convenience of the Examiner.

1. A system comprising:

a digital amplifier controller;

an amplifier output stage coupled to the controller, and configured to receive audio signals from the controller;

one or more sensors coupled to the output stage; and

one or more low-pass filters coupled to the one or more sensors and configured to receive sensor signals from the one or more sensors;

wherein the low-pass filters are configured to filter the sensor signals and to provide the filtered sensor signals to the controller;

wherein the amplifier output stage includes at least two transistors;

wherein the controller is configured to select one of a plurality of different programmable responses based on the filtered sensor signals; and

wherein one or more of the plurality of different programmable responses does not cause a turning off of any of the transistors of the amplifier output stage.

Claim 1, as amended, requires that the "controller is configured to select one of a plurality of different programmable responses based on the filtered sensor signals" and that "one or more of the plurality of different programmable responses does not cause a turning off of any of the transistors of the amplifier output stage". Exemplary programmable responses that do not cause a turning off of any of the transistors of the amplifier output stage include reducing a level of the signals provided to the output stage

(e.g., see paragraph [0050] of the application as filed, which is paragraph [0051] of the published application), and adjusting delays between a high-side signal and a low-side signal (e.g., see paragraph [0054] of the application as originally filed, which is paragraph [0055] of the published application), but are not limited thereto. As explained in paragraph [0017] of the application as originally filed (which is paragraph [0018] of the published application), a benefit of various embodiments of the present invention is that "the controller can provide a programmable response to various different failure conditions that may be detected, rather than being limited to a single response (i.e., shutting down the system), as in the prior art."

It was asserted in the Office Action that responses via the Sng and Scl signals in FIG. 1 of Oki teach that a controller is configured to provide a programmable response based on filtered sensor signals. Further, in the "Response to Arguments" section, it was asserted that a response to signal Sng must be programmed to the microcomputer in order (for the microcomputer to?) respond with the clear signal.

The Sng signal of Oki is asserted when a short circuit is detected based on the output of the counter 44 and the comparator Comp2 in FIG. 9 of Oki. The Scl signal, which is produced by the microcomputer, clears the counter 44. In Oki, when a short circuit is detected (i.e., when the Sng signal is asserted) the output transistor (e.g., Tr11, Tr12, Tr21, Tr22) for which the short circuit was detected is **turned off**. This is explained throughout Oki. For example, in the Abstract of Oki, it is stated that:

> "When the detection voltage exceeded the predetermined voltage, the protection control circuit outputs a short circuit detection signal to the gate of the output transistor. **As a result, the output transistor is turned OFF**." (emphasis added)

In paragraphs [0013]-[0017] of Oki, it is stated that:

> "[0013] The circuit for amplifying and outputting audio signals according to this invention comprises a comparing unit which compares a detection voltage and a predetermined voltage to output a stop signal, and when the detection voltage exceeded the predetermined voltage, outputs a stop signal. The detection voltage here is a potential difference between a source and a drain of the output transistor. **The circuit further comprises, a transistor protection control unit which controls to turn OFF an output of the output transistor when the comparing unit output the stop signal.**

[0014] According the invention, the comparing unit compares the detection voltage and the predetermined voltage. When the detection voltage exceeded the predetermined voltage, a stop signal is output. **When the stop signal is output, the output of the output transistor is turned OFF.** Accordingly, flow of excessively great current to the output transistor due to the short circuit of the output can be prevented.
[0015] The circuit for amplifying and outputting audio signals may further preferably comprise many output transistors. In such a case, each output transistor is provided with the comparing unit and the transistor protection control unit.
[0016] **Furthermore, all of the output transistors are turned OFF when the stop signal is output.**
[0017] Furthermore, it is preferable that the transistor protection control unit comprises a latch circuit which latches the stop signal using the PWM signal as a clock signal, and an AND circuit provided on a gate input side of the output transistor which calculates a logical multiplication of the PWM signal and an inverted signal of the stop signal, **and turns the output transistor OFF irrespective of the PWM signal.**"
(emphasis added)

Paragraphs [0048], [0049], [0053]-[0055], [0070], [0073], [0074], [0094], [0096] and [0103] of Oki also make it clear that Oki's only response to detecting a short circuit is to turn OFF the output transistors, irrespective of the signals output by the PWM pulse generator circuit 3 of Oki. While the output transistors of Oki are turned off, there will be no audio output by the speaker 10 of Oki.

In contrast, in the embodiment of claim 1, as amended, the "controller is configured to select one of a plurality of different programmable responses based on the filtered sensor signals" where "one or more of the plurality of different programmable responses does not cause a turning off of any of the transistors of the amplifier output stage". As mentioned above, exemplary programmable responses that do not cause a turning off of any of the transistors of the amplifier output stage include reducing a level of the signals provided to the output stage, and adjusting delays between a high-side signal and a low-side signal. During a programmable response that does not cause a turning off of any of the transistors of the amplifier output stage, the amplifier output stage can still drive a speaker to produce an audio output. Thus, a listening experience when using the embodiment of claim 1 should be different, and should be better, than a listening experience when using the invention of Oki.

For at least the reasons specified above, Applicants respectfully request that the 102(b) rejection of claim 1 be reconsidered and withdrawn.

Claims 2-13 depend from and add additional features to claim 1. Applicants respectfully assert that these claims are patentable over the cited references for at least the reason that they depend from claim 1, as well as for the features that they add, some of which are discussed below.

Claim 2, as amended, specifies that "the one or more sensors comprise **at least one current sensor and at least one temperature sensor**; wherein the controller is configured to detect over-current conditions in the output stage based on filtered sensor signals from the at least one current sensor; wherein the **controller is configured to detect over-temperature conditions in the output stage based on filtered sensor signals from the at least one temperature sensor**; and wherein the programmable response to the filtered sensor signals is selected from a group of responses that includes compressing at least a portion of the audio signals without causing a turning off of a transistor of the output stage" (emphasis added). It is clear from claim 2 that the at least one temperature sensor is/are different than (i.e., not the same as) the at least one current sensor. Exemplary types of temperature sensors are claimed in **new claim 26**, which depends from claim 2.

In Oki, it is clear that there is not both a current sensor and a separate temperature sensor. It was admitted in the rejection of claim 6 that Oki does not expressly disclose the use of a heat sensor and a current sensor, but it was asserted that it would have been obvious to use a current sensor and heat sensor in Oki to avoid thermal damage due to excessive current. Applicants respectfully disagree. Oki monitors voltages to detect short circuits that can result in thermal damage, and in response to detecting what is believed to be a short circuit, Oki turns OFF the output transistors. In contrast, in Applicants embodiments of claim 2, various different programmable responses can be selected based on the filtered sensor signals from the at least one current sensor and the at least one temperature sensor. Since Oki is only interested in one type of fault, and applies only one type of response, there is no reason that one of ordinary skill in the art

would be motivated to add both a current sensor and a temperature sensor to Oki. In contrast, in the embodiment of claim 2, one response can be selected if an over-temperature condition is detected, a different response can be selected if an over-current condition is detected, and a further response can be selected if both an over-temperature condition and an over-current condition is selected.

Further, claim 2 specifies that one of the possible programmable responses is "compressing at least a portion of the audio signals". Applicants respectfully disagree that OUT1 signal in FIG. 3 of Oki results from compressing at least a portion of the audio signals as a programmable response to the filtered sensor signals. **New claim 27**, which depends from claim 2, claims some additional details of the compressing, according to an embodiment of the present invention.

Claim 4 specifies that "the one or more sensors comprise at least one current sensor, wherein the controller is configured to detect shoot-through current and to responsively adjust delays between a high-side signal and a low-side signal to minimize the shoot-through current." It was alleged in the Office Action that the controller of Oki is configured to detect a shoot-through current by detecting an excessive voltage. Applicants respectfully disagree. Oki is clearly limited to detecting short circuit events. As explained in paragraph [0010] of Oki, a short circuit can occur when "a user erroneously brings a connection wire into contact with a chassis of the BTL output section or the speaker terminals T1 and T2 are short circuited when the wire of the speaker 10 is connected." In contrast, as explained in paragraph [0038] of Applicants' specification as originally filed, a shoot-through current occurs when two transistors of an output stage, which are normally turned on one at a time, are both turned on at the same time, allowing current to flow through both transistors that is much greater than normally flows through a single one of the transistors. Shoot-through is not desirable for a number of reasons, including the fact that it dramatically increases the power consumption of the amplifier. Because a short circuit is quite different that a shoot-through current, Oki's detecting of a short circuit does not teach or suggest detecting a shoot-through current.

It was admitted in the Office Action that Oki does not disclose adjusting delays responsively to detecting a shoot-through current. However, it was asserted that Bridge

teaches this deficiency of Oki. Applicants respectfully disagree. Bridge, which is directed to a DC-to-DC converter, includes a predictive and learning circuit that sets time delays to a minimum value to avoid shoot-through current. As explained above, Oki does not detect shoot-through currents (see column 2, lines 8-11 of Bridge). Further, Bridge does not detect shoot-through currents, and in response thereto, adjust delays. Rather, Bridge is always attempting to minimize delays to prevent a shoot-through current. Bridge does not appear to do anything different based on whether or not a shoot-through current is detected. In fact, Bridge does not appear to worry about detecting a shoot-through current. Rather, Bridge only discusses how to avoid a shoot-through current.

Further, Bridge is not related to an audio output stage, but rather, relates to a DC-to-DC converter that converts a DC voltage from a first DC voltage to a second DC voltage. Accordingly, one of ordinary skill in the art would not look to Bridge to modify the audio amplifier circuits of Oki.

Claim 14, as amended, is reproduced below for the convenience of the Examiner.

14. A method comprising:

sensing a condition of an audio amplifier output stage, wherein the amplifier output stage includes at least two transistors;

providing a sensor output signal corresponding to the sensed condition;

low-pass filtering the sensor output signal to produce a filtered sensor signal;

providing the filtered sensor signal to an audio amplifier controller; and

selecting one of a plurality of different programmable responses based on the filtered sensor signal, wherein one or more of the plurality of different programmable responses does not cause a turning off of any of the transistors of the amplifier output stage.

Applicants respectfully assert that claim 14 is patentable over the cited references for similar reasons to those discussed above with regards to claim 1. Accordingly, Applicants respectfully request that the rejection of claim 14 be reconsidered and withdrawn.

Claims 15-24 depend from and add additional features to claim 14. Applicants respectfully assert that these claims are patentable over the cited references for at least the reason that they depend from claim 14, as well as for the features that they add. For example, for at least some of the reasons discussed above with regards to claim 4, Applicants assert that Oki does not teach or obviate "detecting a shoot-through condition in the output stage", as required by claim 16.

IV. Conclusion

In light of the above, it is respectfully requested that all outstanding rejections be reconsidered and withdrawn. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

The Commissioner is authorized to charge the required fees and any underpayment of fees or credit any overpayment to Deposit Account No. 06-1325 for any matter in connection with this reply, including any fee for extension of time, which may be required.

Respectfully submitted,

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By: /Jeffrey R. Kurin/
Jeffrey R. Kurin
Reg. No. 41,132

FLIESLER MEYER LLP
650 California Street, 14th Floor
San Francisco, CA 94108
Telephone: (415) 362-3800
Facsimile: (415) 362-2928
Customer No. 23910